



HEALTH HOLDING

HAFA ALBATIN HEALTH
CLUSTER
MATERNITY AND
CHILDREN HOSPITAL

Department:	Laboratory and Blood Bank		
Document:	Internal Policy and Procedure		
Title:	Blood/Blood Component Storage, Transport, and Shipping		
Applies To:	All Blood Bank Staff		
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1. PURPOSE:

- 1.1 To ensure proper storage of blood/blood components.
- 1.2 To establish the procedure for the transport of blood within hospital areas in coolers and packing for transport of blood between the outside hospitals.

2. DEFINITONS:

N/A

3. POLICY:

- 3.1 To ensure maximum patient benefit, the blood/blood component should be stored and transported according international standards.
- 3.2 Blood/blood components' storage must be under appropriate and controlled conditions.
- 3.3 All blood components should be used only during the permissible period of storage.
- 3.4 The blood bank and transfusion services use appropriate blood and blood components storage devices.
 - 3.4.1 The blood and blood components storage devices are:
 - 3.4.1.1 Designed for the intended use.
 - 3.4.1.2 Equipped with continuous temperature monitoring system (temperature recording).
 - 3.4.1.3 Equipped with audio/visual alarm systems.
 - 3.4.2 The device's alarm and monitoring system conforms with the following:
 - 3.4.2.1 Activates at a temperature that allows for intervention before the contents reaches unacceptable temperature.
 - 3.4.2.2 Activates at an area staffed 24 hours a day, seven days a week.
 - 3.4.2.3 Connected to a separate or DC power supply.
 - 3.4.3 The alarm system is checked daily.
 - 3.4.4 Alarm activation temperatures are checked quarterly.
 - 3.4.5 The inner temperature of blood storage devices is monitored and recorded at least once a day using a standardized thermometric device.
 - 3.4.6 In the event of failure of continuous temperature monitoring, temperature recording, or alarm systems, the inner temperature is monitored and recorded every four hours.
 - 3.4.7 In case of any malfunction, blood bank technicians/ specialists know the appropriate actions to be taken.
- 3.5 Whole blood / RBCs storage refrigerators:
 - 3.5.1 Temperature must be maintained between 1 °C and 6 °C.
 - 3.5.2 Must contain only blood and blood components.
- 3.6 Blood Bank Refrigerators for Reagents:
 - 3.6.1 Must be maintained at 2 °C and 8 °C.
 - 3.6.2 Must be used for storage of blood specimens and blood bank reagents.
- 3.7 Freezer for Storage of Blood Components:
 - 3.7.1 Temperature must be maintained at ≤ -18 °C.
 - 3.7.2 Has calibrated thermometer, placed on top shelf of freezer or immersed in antifreeze
- 3.8 Platelet agitator incubator:

- 3.8.1 Temperature must be maintained between 20 °C and 24 °C.
- 3.8.2 Alarm systems should alert when the agitator has malfunctioned to prevent pH from decreasing below 6.2.
- 3.9 Proper transport and shipping of blood component is extremely important for the benefit of patient .
- 3.10 Blood/blood components are transported in properly insulated container within the specified temperature.
 - 3.10.1 RBC components: between 1 and 10°C.
 - 3.10.2 PC components: as close as possible to 20 and 24°C.
 - 3.10.3 FFP units are maintained at frozen state.

4. PROCEDURE:

4.1 Storage:

4.1.1 Refrigerators:

4.1.1.1 Frequency of checks:

- 4.1.1.1.1 Inspect and record the internal temperature daily (every 4 hours).
- 4.1.1.1.2 In the event of failure of continuous temperature recording, the displayed temperature is monitored and recorded every four hours.
- 4.1.1.1.3 The recorded temperature on all systems is checked at least once daily by supervisor of blood bank or his deputy.
- 4.1.1.1.4 Check audio/visual alarm daily and record.
- 4.1.1.1.5 Change graph weekly if available:
 - 4.1.1.1.5.1 All unusual rises and decreases in temperature must be explained and recorded.
 - 4.1.1.1.5.2 Charts must indicate inclusive dates of temperature readings and identities of personnel inserting and removing the chart.
- 4.1.1.1.6 Checking alarm for power failure is done monthly.
- 4.1.1.1.7 Low and high alarm checks are done every 3 months.

4.1.1.2 Alarm Check Procedure:

- 4.1.1.2.1 Verify that the alarm circuits are operating, the alarm is switched on and the starting temperature is 1-6 °C.
- 4.1.1.2.2 Immerse temperature sensor and calibrated mercury thermometer in a container of saline kept at 3-5 °C. (or the container with the thermocouple)
- 4.1.1.2.3 For low temperature check:
 - 4.1.1.2.3.1 Add crushed ice (-4 °C or cooler) slowly while stirring constantly. To achieve this temperature, add several spoonful of table salt to the slush.
 - 4.1.1.2.3.2 Read and record temperature when alarm sounds. This should happen at no lower than 1°C.
- 4.1.1.2.4 For high temperature check:
 - 4.1.1.2.4.1 Add warm water slowly (e.g. tap water) while stirring constantly.
 - 4.1.1.2.4.2 Read and record temperature when alarm sounds. This should happen at no greater than 6 °C.
- 4.1.1.2.5 Daily alarm check:
 - 4.1.1.2.5.1 By pressing the alarm test button (if available).
 - 4.1.1.2.5.2 If the alarm test button is not available, immerse the probe of the temperature sensor into tap water.
 - 4.1.1.2.5.3 Audio- visual alarm must start. Record on the daily alarm checking and sign.

4.1.2 Freezers:

4.1.2.1 Frequency of checks:

- 4.1.2.1.1 Inspect and record the internal temperature daily (every 4 hours).

- 4.1.2.1.2 In the event of failure of continuous temperature recording, the displayed temperature is monitored and recorded every four hours.
- 4.1.2.1.3 The recorded temperature on all systems is checked at least once daily by supervisor of blood bank or his deputy.
- 4.1.2.1.4 Check audio/visual alarm daily and record (if alarm test button is available).
- 4.1.2.1.5 Change graph weekly if available:
 - 4.1.2.1.5.1 All unusual rises and decreases in temperature must be explained and recorded.
 - 4.1.2.1.5.2 Charts must indicate inclusive dates of temperature readings and identities of personnel inserting and removing the chart.
- 4.1.2.1.6 Checking alarm for power failure is done monthly.
- 4.1.2.1.7 High alarm checks are done every 3 months.
- 4.1.2.2 Alarm Check Procedure (High temperature alarm check):
 - 4.1.2.2.1 The first method:
 - 4.1.2.2.1.1 Protect frozen components from exposure to elevated temperatures during the test.
 - 4.1.2.2.1.2 Keep freezer door slightly ajar.
 - 4.1.2.2.1.3 Check and record temperature on calibrated thermometer and graph when alarm sounds.
 - 4.1.2.2.1.4 Plasma freezers alarm must sound at no higher -18 °C.
 - 4.1.2.2.2 Other method:
 - 4.1.2.2.2.1 Protect frozen components from exposure to elevated temperatures during the test.
 - 4.1.2.2.2.2 Use a thermometer that will accurately indicate the temperature of alarm activation. Compare these readings with the temperatures registered on the recorder.
 - 4.1.2.2.2.3 Warm the alarm probe and thermometer slowly (e.g. in warm water, exposure to air). The specific temperature of activation cannot be determined accurately during rapid warming, and the apparent temperature of activation will be too high.
 - 4.1.2.2.2.4 Record the temperature at which the alarm sounds, the date of testing, the identity of the person performing the test, the identity of the freezer and calibrating instrument, and any observations that might suggest impaired activity.
 - 4.1.2.2.2.5 Return the freezer and the alarm system to their normal conditions.
- 4.1.2.3 Daily alarm check:
 - 4.1.2.3.1 By pressing the alarm test button (if available).
- 4.1.3 Platelet incubator:
 - 4.1.3.1 Inspect and record the internal temperature daily (every 4 hours).
 - 4.1.3.2 In the event of failure of continuous temperature recording, the displayed temperature is monitored and recorded every four hours.
 - 4.1.3.3 The recorded temperature on all systems is checked at least once daily by supervisor of blood bank or his deputy.
 - 4.1.3.4 Check audio/visual alarm daily and record (if alarm test button is available).
 - 4.1.3.5 Change graph weekly if available:
 - 4.1.3.5.1 All unusual rises and decreases in temperature must be explained and recorded.
 - 4.1.3.5.2 Charts must indicate inclusive dates of temperature readings and identities of personnel inserting and removing the chart.
 - 4.1.3.6 Checking alarm for power failure is done monthly.

- 4.1.3.7 Low and high alarm checks are done every 3 months (if the temperature sensor is available).
- 4.1.4 Checking alarm for power failure: Each alarm must have Emergency power backup systems.
 - 4.1.4.1 Remove the power plug of the refrigerator, platelet incubator or the freezer.
 - 4.1.4.2 Audio/visual alarm sound must start to operate.
 - 4.1.4.3 In case the alarm is not operating, call biomedical engineering to take corrective action.
 - 4.1.4.4 Report the incident and corrective action taken to the technician supervisor or his deputy.
- 4.1.5 Notes:
 - 4.1.5.1 Several methods are available to determine whether the frozen plasma component may have inadvertently thawed during storage: freeze the plasma bag in a flat, horizontal position but store it upright (air bubbles trapped along the bag's uppermost broad surface during freezing will move to the top of the container if the unit thaw during storage).
 - 4.1.5.2 Audible alarm signals must be heard in an area which will ensure appropriate response 24 hours a day.
 - 4.1.5.3 Temperatures may increase above acceptable limits for several reasons, including:
 - 4.1.5.3.1 Improperly closed door.
 - 4.1.5.3.2 Insufficient refrigerant.
 - 4.1.5.3.3 Compressor failure.
 - 4.1.5.3.4 Dirty or blocked heat exchanger.
 - 4.1.5.3.5 Loss of electrical power.
- 4.2 **Instructions for blood component storage devices' malfunction:**
 - 4.2.1 Check for any obvious malfunction:
 - 4.2.1.1 Open door.
 - 4.2.1.2 Unit is unplugged.
 - 4.2.1.3 Fan is not circulating.
 - 4.2.2 Call biomedical engineering immediately.
 - 4.2.3 Transfer the blood component units to other blood bank storage equipment suitable for the product.
 - 4.2.4 Observe the temperature until it comes back to normal, and agitator is working for platelet incubator.
 - 4.2.5 Return the blood component units back after making sure that the temperature is stable.
 - 4.2.6 If temperature does not come back to normal or unstable, ensure that the machine is not to be used. Fix on label (do not use, out of service).
 - 4.2.7 If there is a problem with the alarm system, Call biomedical engineering to take appropriate corrective actions such as those suggested by the manufacturer, record the nature of the correction, and repeat the alarm check to document that the corrections were effective.
 - 4.2.8 Report the incident and corrective action taken to supervisor or his deputy.
- 4.3 **Cleaning:**
 - 4.3.1 Blood bank refrigerators and other machines: It is done weekly (as applicable) with 10 % chlorine.
 - 4.3.2 Cleaning of blood bank freezers: It is done monthly (as applicable) with 10 % chlorine. Frozen products are checked for date monthly.
- 4.4 **Transport and shipping:**
 - 4.4.1 Transport in coolers:
 - 4.4.1.1 Equipment:
 - 4.4.1.1.1 Cooler box
 - 4.4.1.1.2 Ice packs
 - 4.4.1.2 Steps:
 - 4.4.1.2.1 Remove appropriate number of ice packs form -20 °C freezer

- 4.4.1.2.2 Place frozen ice packs on either side of the plastic container inside cooler. This maintains the Fridge temperature for 6 hours.
- 4.4.2 Shipping (Packing):
 - 4.4.2.1 Equipment:
 - 4.4.2.1.1 Cooler transport container
 - 4.4.2.1.2 Ice packs
 - 4.4.2.2 Steps:
 - 4.4.2.2.1 Inspect the container for any inner or outer breaks
 - 4.4.2.2.2 Immediately before packing for shipment, blood components must be inspected for:
 - 4.4.2.2.2.1 Expiry (or collection) date.
 - 4.4.2.2.2.2 The integrity of the bag- check for leaks.
 - 4.4.2.2.2.3 Evidence of unusual discoloration (segments appearing lighter or darker in color than the primary bag contents, purple color to the red cells or cloudiness), gross lipaemia.
 - 4.4.2.2.2.4 The presence of large clots, white particulate matter in the primary container.
 - 4.4.2.2.2.5 Grossly visible aggregates in the platelet concentrate.
 - 4.4.2.2.3 The component is shipped for transfusion only if the specified requirements are met.
 - 4.4.2.2.4 For Red cells:
 - 4.4.2.2.4.1 The temperature of the blood during shipment must be kept between 1 and 10 °C.
 - 4.4.2.2.4.2 Well-insulated boxes with some types of refrigerants are used. Blood units placed in the bottom covered by cardboard, then securely bagged wet ice or coolant on top and keep in upright position.
 - 4.4.2.2.4.3 Ice should not be put in direct contact with blood at any time because it can cause hemolysis of the red cells.
 - 4.4.2.2.5 For Platelets:
 - 4.4.2.2.5.1 Use well – insulated container, with no ice, to maintain the temperature of this shipment between 20 and 24 °C.
 - 4.4.2.2.5.2 Platelets are not agitated during transport.
 - 4.4.2.2.6 For Frozen components:
 - 4.4.2.2.6.1 Must be shipped in the frozen state in properly insulated container.
 - 4.4.2.2.6.2 Dry ice (or as per availability) should be placed at the bottom of the well – insulated container, between the layers of the components, and again at the top.
 - 4.4.2.2.6.3 Care must be taken to insulate the components from breakage during shipment.
 - 4.4.2.3 The temperature of blood and its components must be monitored and documented during shipment from one location to another.
 - 4.4.2.4 On the 'Requests of blood from other hospitals' and the 'Dispense of blood and blood components to outside facilities' forms, record the followings:
 - 4.4.2.4.1 Blood component type
 - 4.4.2.4.2 Unit number (s)
 - 4.4.2.4.3 Blood group (s)
 - 4.4.2.4.4 The current component temperature
 - 4.4.2.4.5 The expired date (s)
 - 4.4.2.4.6 Package date and time
 - 4.4.2.4.7 Name and signature of the person who perform the shipment

- 4.4.2.4.8 Identity of sending facility
- 4.4.2.5 Enclose the original 'Dispense of blood and blood components to outside facilities' form that states that blood found to be non-reactive by screening test for transfusion transmitted diseases.
- 4.4.2.6 Fix a copy of the 'Dispense of blood and blood components to outside facilities' form to 'request of blood from other hospital' and keep them in the specified file.
- 4.4.2.7 Inspection on receiving:
 - 4.4.2.7.1 Evaluation and verification of the shipping condition of each blood component
 - 4.4.2.7.2 Checking for meeting predefined acceptance criteria for each blood component received.
 - 4.4.2.7.3 Evaluation and verification of the agreement of units' identification information on both the component unit and the 'Dispense of blood and blood components to outside facilities' form:
- 4.4.2.8 Records should be maintained about:
 - 4.4.2.8.1 The mean of transport:
 - 4.4.2.8.1.1 Transport containers.
 - 4.4.2.8.1.2 Cooler boxes.
 - 4.4.2.8.2 Name of the sender and receiver facility .
 - 4.4.2.8.3 Name and title of the persons who issue the blood and who also receive it.
 - 4.4.2.8.4 Date, time and temperatures on issue and on receive .
 - 4.4.2.8.5 Blood unit numbers.
 - 4.4.2.8.6 Blood Safety certificate .
- 4.4.3 Monitoring Temperature During Shipment Of Blood:
 - 4.4.3.1 Principle:
 - 4.4.3.1.1 Some form of temperature indication or monitoring is desirable when shipping blood. The temperature of the contents of a shipping container used for whole blood or liquid- stored red cell components can be ascertained when the shipment is received.
 - 4.4.3.2 Procedure:
 - 4.4.3.2.1 Open the shipping container and promptly place the sensing end of a calibrated liquid- in-glass or electronic thermometer between two bags of blood or components (labels facing out). It is better to secure the "sandwich" with two rubber bands.
 - 4.4.3.2.2 Close the shipping container.
 - 4.4.3.2.3 After approximately 3 to 5 minutes, read the temperature.
 - 4.4.3.2.4 If the temperature has exceeded the acceptable range, quarantine the units until their appropriate disposition can be determined.
- 4.5 **Requesting and receiving of blood components:**
 - 4.5.1 This is detailed in a separate chapter "receiving/sending blood products from/to outside facilities". (LB-IPP-203).
- 4.6 **Released nonconforming blood and blood components:**
 - 4.6.1 Blood and blood components, that are determined after release not to conform to specified requirements, shall be evaluated to determine the effect of the non-conformance on the quality of the product.
 - 4.6.2 Corrective action taken:
 - 4.6.2.1 Immediately call the ward, treating doctor or the hospital about the case and the non-conformance.
 - 4.6.2.2 Try for retrieval of the unit.
 - 4.6.2.3 If transfusion was started, transfusion must be stopped and the bag is returned to blood bank.

4.6.2.4 OVR shall be written. Maintain records of the nature of non-conformances and subsequent actions.

5. MATERIALS AND EQUIPMENT:

5.1 Records and Forms:

- 5.1.1 Refrigerator temp. sheet
- 5.1.2 Plat. Incubator temp. sheet
- 5.1.3 Freezer temp. sheet
- 5.1.4 Weekly checking of temperature chart File.
- 5.1.5 Quarterly maintenance record
- 5.1.6 Monthly Check Alarm System Powered by Battery record
- 5.1.7 Dispense of blood and blood components to outside facilities form
- 5.1.8 Requests of blood from other hospitals form
- 5.1.9 Register of 'blood units received from other hospitals'

5.2 Materials and Equipment:

- 5.2.1 Calibrated thermometers.
- 5.2.2 Cooler box.
- 5.2.3 Cooler transport container.
- 5.2.4 Ice packs.
- 5.2.5 Dry ice (as per availability).

6. RESPONSIBILITIES:

- 6.1 Blood bank staff members like technician/ specialist and supervisor of blood bank or his deputy have to follow the detailed procedures.


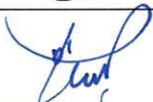




7. APPENDICES:

N/A

8. REFERENCES:

- 8.1 The Unified Practical Procedure Manual for Blood Banks in The Arab Countries, 1434-2013.
- 8.2 The Standard Policy for Blood Banks in The Kingdom of Saudi Arabia, 1st edition, 1435-2014.
- 8.3 National Standards for Clinical laboratories and Blood Banks, 1st edition, 2015.
- 8.4 AABB Technical manual, 18th edition, 2014.
- 8.5 AABB Standards for Blood Banks and Transfusion Services, 30th edition, 2016.
- 8.6 Mollison's Blood Transfusion in Clinical Medicine; 12th edition, 2014.
- 8.7 Good Manufacturing Practice for Blood Establishments, Version 2.0, May 2019, Saudi FDA

9. APPROVALS:

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